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SOCIETY OF ARTS.

FRIDAY, SEPTEMBER 2nd, 1853.

PRODUCTION OF STARCH.

DURING the time that wheat was at a high price, in 1796, this Society, with the view of saving as much grain as possible for food, offered a premium of the Gold Medal, or Thirty Guineas, for the discovery of a method of manufacturing starch from materials not used as food for man; and, in 1796, it was awarded to Mrs. Jane Gibbs, of Portland, who prepared as much as two hundred-weight of starch from the root of the common *Arum maculatum.* It appears, from Mrs. Gibbs' communication, that a peck of the roots yielded about four pounds of starch, and was thus prepared:—The roots being cleansed and pounded in a stone mortar with water, the whole was then strained, and after settling, the water being poured off, the starch remained at the bottom. A sample was deposited in the Society's Museum.* The manufacture of this article, notwithstanding the high price of its cost, continued to be carried on in the Island of Portland for many years, and was sold under the name of the "Portland Arrowroot."

Mr. Groves, in a paper communicated to the *Pharmaceutical Journal,* states that the manufacture is now almost extinct, on account of the change which has taken place in the cultivation of the land there, no fallow every other year, as formerly, being allowed, the usual rotation of crops being now introduced. The growth of the wild arum is therefore to a great extent put an end to, and with it the manufacture of arrowroot. Besides this, the common has been enclosed for Government purposes. It appears that the manufacture is now confined to one old woman, and no quantity can be obtained, though she gets 1*s.* 4*d.* a pound for it. The Portlanders value it much. Compared with Bermuda arrowroot it does not make so clear or firm a jelly, but it is perfectly inodorous, tasteless, and destitute of colour. The granules under a microscope appear of an irregular spherical shape, varying much in size, but on the average are smaller than ordinary starches, except rice-starch. It is singular that this arrowroot should only be manufactured on the Island of Portland; though on some of the commons near Weymouth the plant is abundant. The country people there however do not appear to know that it is of any use. This arrowroot is stated to have been prepared on the island from time immemorial; and it is a singular fact, that the plant is called by the islanders arrowroot, from its arrow-shaped leaves. Mr. Groves suggests whether the *Maranta arundinacea* may not have derived its English name from the previously-known arrowroot of the Island of Portland, and not from what is usually stated—that the name is taken from the use to which the early American Indians were accustomed to apply the juice extracted from another species of *maranta,* the *Maranta galanga,* employed as an antidote to poison, in which hostile tribes dipped their arrows.

At the present time, when corn is dear, and the potato has been so uncertain a crop for many years past, the discovery of a new source whence an abundant supply of starch may be cheaply obtained is highly important, not merely as an article of food, but as forming a large item in many manufacturing processes—such as the glazing of fabrics, manufacture of dextrine, brandy, &c. With this view, it appears that *La Societé d'Encouragement* in France has offered a prize "for the cultivation in France of farinaceous roots for food, not hitherto cultivated in Europe, suited by the quantity and quality of their products to be substituted for the potato." M. Basset, a French physician, has claimed the prize. He states that, after a laborious research for three years, he has at last found a plant in which the fecula, or starch, is equal, both in quantity and quality, to that of the potato. The plant is the *Fritillaria imperialis,* the well-known crown imperial of our gardens. The bulbs of this plant sometimes reach the weight of three quarters of a pound, or thereabouts, and have a strong smell. Each scale of the bulb is almost entirely composed of fecula—so much so, that it may with truth be said, that with the exception of a thin skin covering them, and a few bunches of vascular tissue, they are one entire mass of pure starch. The grains of the starch are oval, and of a perfect white colour. M. C. Robin, a skilful microscopist, states the diameter of the grains to be of three sizes.

Some experiments show that the production of pure starch amounts to thirty or thirty-five per cent. of the bulbs used, while potatoes yield not more than twenty-eight per cent. of starch.

Careful comparative analyses of the potato, and the crown imperial, give the following results:

Potato.		Crown Imperial.	
Water . . .	70	Water . . .	68
Starch . . .	20	Starch . . .	23
Soluble matters	4	Soluble matters	5
Dry residue . .	6	Dry residue . .	4
	100		100

From the experiments thus made, we may fairly reckon on a produce varying from twenty-three to thirty per cent. of the fresh bulbs employed, showing a result in favour of the crown imperial of three per cent. at least.

The starch, if intended to be used in the arts, needs only two or three washings in water; but if for the purposes of food, then more care must be taken in its preparation to get rid of the peculiar flavour and smell. This is accomplished by washing it for forty-eight hours in clean water, in addition to the previous washings, changing the water two or three times during the above period. The starch may be rendered also more pure by adding to the water in which it is washed one-fiftieth part of common vinegar, or one-thousandth part of soda.

The method of obtaining the starch is as follows:—The bulbs, after being well washed, are rasped in the same manner as potatoes, but with less trouble, and the pulp placed on a sieve, on which a stream of water is kept continually flowing; the starch falls to the bottom, and the water being poured off, is left to dry. It is then washed and soaked as above described, according to the purposes for which it is intended.

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* Soc. Trans., vol. XV., p. 237.

The next point is, the cost and facility of cultivation. The Crown Imperial, though a native of the East, and said originally to have been brought from Constantinople to France, in 1570, is now so much acclimatized as to be considered indigenous. It grows freely in all parts of France, and stands the severest cold of winter and the greatest heat of summer. The bulbs keep well in cellars or store-rooms till the spring; and in this respect they are equal to the potato.

It is propagated by offsets, which are developed outside the old bulbs or by sowing the seed. The offsets are planted about six inches apart, in rows, one foot from each other, in a light loamy soil, without manure, but well dug twice. In the spring it is again dug between the rows to destroy the weeds, and in July the bulbs are taken up for the extraction of the starch, and the offsets are taken off and preserved till September for raising the next crop. At the end of the first year the bulb will weigh, on the average, three or four ounces, but will weigh half a pound if left in the ground another year, and the yield of starch is proportionably greater. This second or biennial method of cultivation is preferable to the first, notwithstanding it requires a second digging in the autumn, and a third digging in the following spring.

By the annual method of cultivation, an acre planted with 88,000 offsets produces, after supplying offsets for the next crop, an average of 15,840 lbs. of bulbs, which, at the moderate calculation of 23 per cent., yield 3,600 lbs. of starch. By the biennial method of cultivation, the acre produces 44,400 lbs. of bulbs, or 10,000 lbs. of starch; giving an annual produce of 5,000 lbs., instead of 3,600. The cost of cultivation by the annual method, and of the manufacture of the starch, appears to amount to 2*s.* 10*d.* for 100 lbs.; whilst by the biennial method of cultivation the cost is reduced to nearly one-half.

Even allowing that there may be some error in the figures, it is quite clear that the cost of producing starch from the crown imperial will not exceed 4*s.* for the 100 lbs., whilst the starch from potatoes is sold at 12*s.* the 100 lbs. There is, however, another advantage in cultivating this bulb; it will not bear a freshly-manured land, but takes its place in crop best after another crop for which the land has been manured, and it leaves the ground ready for a cereal crop with only half the usual quantity of manure.—This is M. Basset's plan.

CHINA-STONE AND CHINA-CLAYS OF CORNWALL.

The subject of China-stone and China-clays of Cornwall is so important, and so little known, that it is thought desirable to print the following essay, communicated to the Royal Polytechnic Society, and published in its Journal.

An Essay on the China-stone and China-clays of Cornwall, with a description of some Mechanical Improvements in the mode of preparation of the latter.

BY MR. H. M. STOKER, OF ST. AUSTELL, CORNWALL.

The china-stone and china-clays, of our county, or the disintegrated granites, have, of late years, assumed a no less important than interesting feature in its history; not only to the capitalist, from the great addition the discovery of their use has made to its commercial importance; to the working-classes, from the necessarily co-existent increase of employment; to the shipping, from the quantity annually exported; but also to the traveller, from the picturesque scenes, the preparation of these articles have added to the previously existing and unexampled ones offered him for contemplation in the various modes of raising and rendering available the mineral wealth for which we have been so long and so justly famed. And not only to these, but to the practical chemist as well, does it afford matter for speculation, inasmuch as the supply of the former of these articles is so limited, as to require, in the course of a very few years, some cheap and easily-available substitute; whether to be supplied from this or from some other county, is a question to be determined only by the conjoined efforts of the miner, the geologist, and the analytical chemist.

From these few remarks, any apology for the appearance of the present essay would only be out of place, especially when we take into consideration the paucity of information possessed even by such men as the jurors of the Exhibition of 1851, as proved by their indifference both to the purity and quantity of the raw material; and this is now the more to be deplored from the contrast presented to us in the degree of attention paid by those jurors who investigated the merits of this article in its manufactured state, and by the observations necessarily made on other raw material; not less than from the fact that in no work with which I am at present acquainted has the preparation of the source of this article been fully described.

These observations will be found to refer generally to those districts whence the greater amount is attainable; and from them I have reason to hope that some few general laws may be deduced, whereby, when the present source is exhausted, other localities may be found in the county for their supply.

Attention was first directed to the fact, that the disintegrated granite and clays of our county, as well as those of Devon, when fused or burnt, could be rendered available to the potter, in 1768, by the late Mr. Cookworthy, of Plymouth, who extensively exported them to the potteries of Staffordshire for that purpose, from Devon; subsequently to which large beds of a like description of clays were found in the parish of St. Stephens; and it having been ascertained that the decomposing granite from which such beds are formed was capable, when fused, of forming a suitable glaze for the articles made of the clay, a large trade was at once opened, which has continued progressively to increase till the present time.

The disintegrated granite, under the name of china-stone, from the use to which it was applied, was exported at a later period than the china-clay, or kaolin. This article of commerce not having been introduced till the year 1802, when it was first raised from a bed of great purity, containing no iron or manganese, but merely felspar, silica, and mica, in varying proportions; and this is at present the only source from which it can be obtained of a sufficient degree of purity for ordinary purposes; though from its price, and the efforts that have been made by chemists, both here and in the potteries, to gain a substitute for it, it is very doubtful whether it will long continue so; more especially if the distance we are placed from Stafford be taken into consideration.

Most of the granites from which the china-stone was formed differ from ordinary granite only in the existence in the latter of plates of talc, hornblende, or diallage, the presence of either of which render the china-stone in which they are found, though but in small proportions, of not even the slightest use, from the black or brown-coloured slag of silicate of iron or manganese, found on fusion. Some variation, too, may be found in the amount of each of the ingredients which I have named; but this affects neither the clay formed on a continuation of the disintegrating process, nor is it supposed to exert any influenee on the glazing properties of the stone.

The places in which a search for this article would be instituted with the greatest probability of success is in the proximity of fissured granite rocks, containing, or supposed to have contained, softened stone; or in hills with rounded heavy summits, the beds of which are placed horizontally, and felspar (or feldspar) forming its predominating ingredient.

The bed from which it is obtained is about three-fourths of a mile in extent on the contiguous borders of the parishes of St. Dennis and St. Stephen's, occupying almost the centre of the central granite district of the county, and is surrounded by other primary rocks, of igneous origin, which, as they stretch towards the coast on either side, merge into beds of killas, or clay-slate; on the eastern and northern boundaries the granite is more irregular and abrupt in character than on the other sides, is more porphyritic, and contains a much larger proportion of felspar, in large white or red opaque, cubic, or rhomboidal crystals; while on the south it is separated from the neighbouring granite by a large elvan dyke; and it is worthy of notice, that while on one side of this, you may find China-stone perfectly pure, on the other, only from one to two feet distant, the stone is rendered useless by the presence of small plates of talc, embedded in dense gray granite, which also forms a portion of the eastern boundary.

Any one who has carefully studied the porphyry dykes, or the general nature of the primary rocks of our country, cannot but have noticed the difference in the temperature at which some of them have been upheaved compared to that of others; for while some of our granites are composed of substances which have in their crystals a certain amount of water that has not been lost, others have no trace of it, their felspar having become an amorphous-looking powder (kaolin); and others presenting the same waxy edge on fracture that is noticed in porcelain, particularly the elvan dykes: and from this it has been conjectured, though to me it appears doubtful, that as the melting point of other minerals was considerably below that of these rocks, at the time of the extraordinary convulsion to which our county has been subjected, the China-stone was by this means freed from iron, &c.; and that on its having reached the surface, the water by which it was surrounded at once caused the crystals of felspar to split, lose their outline and character, and become easily acted on by the solvent power of rain-water, which, by depriving it of a portion of its potash, leaves the crystals of quartz, or silicic acid, and plates of mica, glistening with a silvery hue, imbedded in a mass of silicate of potash and alumina; which, from the loss of crystallization, cannot be termed felspar, nor is it kaolin, for it has not been subjected sufficiently long to the causes which lead to its formation.

Many have thought, and do still suppose, that the clay is gradually forming into granite, and confidently assert that the whole of the middle granite tract was undoubtedly formed from clay beds; the geologist, I need scarcely add, will be able to estimate this at its proper worth: others also add, that this mass has been thrown up in the water which at first covered it, and fell back on itself, which they assert accounts for the flattened outline the tops of the hills of this district present.

The chief causes which I believe to have led to its disintegration, and not only to the formation of China-stone, or China-clay, but to that of all the land at present in cultivation, or capable of being cultivated, are; first, external physical agents, proved by the fact that China-stone is very seldom found at a depth of more than from twenty to thirty feet from the surface; the influence of the seasons; the changes from hot to cold on a body composed of crystals possessing such different expansive powers as those of felspar and quartz; and the solvent power of rain-water: while, as chemical agents, we have; secondly, the influence of the excess of carbonic acid in the air, as well as that from the interior of the earth, of the influence of which we have abundant proof in the excellent crops obtainable near lavas, or wherever this gas can gain access to the compound silicates of which the greatest portion of the earth's crust consists; and by the influence of respiration in rooms provided with windows, which may have been exposed for a long period to its application.

At present, while there is a great demand for the article, the spot from whence China-stone is procured presents the appearance of a large rabbit-burrow, as there are no less than nine sets for the district, the proprietor of each of which has his portion of the hill covered with the mouths of pits, around which are stationed a number of men with their wagons, who, after the China-stone has been raised by quarrying and the employment of powder, carry it to one of the nearest ports to be shipped for the potteries of Staffordshire and Worcestershire. These ports are distant seven or nine miles from the quarries, entailing in this transport a considerable amount of land-carriage, and a consequent increase in the price, which of late years has been raised from 12*s*. to 20*s*. free on board, at Par, Pentewan, or Charlestown; still the demand has by no means diminished, and the proprietors of these setts have been obliged to fix a certain limit to their annual supply of 18,000 tons, which rate of consumption will have effected the removal of all the China-stone in these beds in rather less than fifty years.

The number of people employed in its preparation are comparatively few, as the operation of blasting requires but two or three persons in each pit; and in loading the wagons the parties employed as carriers are but too eager to fill in order to gain a load. The before-mentioned reasons render the question of supply an important one, and one well worthy the attention of the landowner as to future resources, and the influence the discovery of any large bed of good stone would exert on his pocket; though, while the present setts of the China-stone Company of Cornwall hold out, they not only can but will maintain a monopoly.

China-stone, in its present state, consists of a mixture of quartz, felspar, and mica, blended so as to form an homogenous mass, which very much resembles granite, though its texture is not so compact; the quartz exists in small bluish-white and transparent crystals, the edges of which, by the process of disintegration, are rendered more or less indistinct, and they have become more transparent than when in the form of granite. These crystals are imbedded in a mixture of white felspar, which has lost a portion of its potash, and small opaque scales of mica having a lustrous silvery aspect, and very thin: the granite from which it has been formed is of the simplest kind, the commoner forms containing, in addition to the mica, quartz and felspar, which may be either red or gray, crystals and scales of hornblende, diallage, or talc, with a more or less appreciable amount of iron, indicated by the black spots formed on fusion or calcination; and as the chemical composition of this article, when pure, should indicate an absence of these deteriorating qualities, until some cheap mode of separating these constituents from the otherwise vitrifiable granites of our county be found, the China-stone at present in use must retain its pre-eminence, consisting as it does of a pure double silicate of potash and alumina, which, when fused, forms a pearl-white translucent mass, firm and resonant, consisting of an opaque body of nearly perfectly formed kaolin, surrounded by and diffused through the glaze of silicic acid, to which its transparency is due: and not only does the foregoing deteriorating substances render the article useless, but should there be a very great excess of quartz crystals or silica the article will not, from the formation of single silicates, be capable of fusion at any temperature; though this fault may be remedied by the addition of either potash or soda, to which the vitrification not only of this, but of the various kinds of glass, is also due; felspar, according to Liebeg, containing 17·75 per cent. of potash.

China-stone is used in the potteries for a number of purposes, the most important of which are; first, in the formation of clay bodies to form biscuit ware; secondly, to strengthen clays rendered poor by the absence of potash; and thirdly, in the preparation or construction of glazes for the calcined biscuit ware, when mixed with other ingredients.

The manufactured China-stone and China-clay is termed "pottery," of which there are several varieties, each containing different proportions of China-stone, clay, and other articles. In the porcelain series there is said to be but three per cent of potash; but this I imagine, from the transparency and purity of the body, to be inaccurate. The Chinese used to employ the ashes of ferns, which, from the amount of carbonate of potash they contain, gave to it that richness and blending of the body with the glaze for which it has been long remarkable; bone-ash was also used, both by the Chinese and French, and is now employed by our potters in considerable quantity, for the sake of the phosphate of lime it contains, which, during the process of fusion, adds considerably to the transparency of the ware without rendering the glaze liable to craze or peel off, as would be the case were lime alone employed; in fact, at times, during a single firing, more than 5,000*l.* worth of pottery is rendered useless by the admixture of this earth, the surface of the services becoming covered with a congeries of cracks and fissures; hence great care is necessary to prevent its addition.

The terms employed to designate the kinds of calcined and fused wares, are: pipe-clay, the least used and least important; queen's ware; terra cotta; basalts; and porcelain biscuit; the whole of which were introduced by Wedgewood, to whose persevering, accurate, and scientific research, we are indebted for the position our pottery now holds; and it should not be forgotten that the rapid strides by which we have gained it, and the discoveries that have of later years been made in this art, have been wholly derived from a good practical acquaintance with chemical analysis, the importance of which cannot be too strongly urged on both the potter and the producer of the raw material. The other and more common wares are, porcelain; pottery, an inferior kind of porcelain; and earthenware; to the description of which I shall for the present confine my attention, that of the before-mentioned wares, as well as of parian, biscuit china, &c., belonging more strictly to the province of the potter than to that of the writer of the present Essay; though, from the history of the experiments to which their existence is due, the subject will be found fraught with interest to the chemist and geologist.

Until a very late period pottery manufacture was comparatively unknown in England; in the eighteenth century we were indebted entirely to the Chinese for our best, and to the continental potteries for our commoner wares. A century has but elapsed, and to the credit of the industrious, the persevering, the indefatigably speculating Englishman, be it added, that from pole to pole, under any portion of the globe's equator, wherever the traveller may roam in search of adventure, no less than through the length and breadth of his happy little island home, he will find, in his cup, his plate, or his dish, a never-dying testimonial to the enterprising character of the Englishman.

In porcelain or China, and the coarser variety termed pottery, the ingredients are so combined as to act chemically on each other, the decomposed felspar, consisting of a fusible glass of silicate of alumina and potash, more opaque than that formed by the fused silex in which it is disseminated; and when the body is formed of China-clay, infusible at the highest temperature, in the process of vitrifaction, it is so acted on as to form a substance uniformly opaque, having a vitreous, waxy fracture; and when coloured by some metallic base, is termed stone ware.

There are two kinds of China or porcelain; the one termed the hard China was formerly imported from France, though, of late years, it has been altogether superseded by the second variety, or soft China. The body of hard China may be conveniently formed by a mixture of ingredients in the following proportions:

Kaolin, or China-clay	70 parts
Felspar	14 ,,
Sand	12 ,,
Selenite	4 ,,

which, calcined, forms the biscuit; this, after being dipped in a mixture of potash and felspar, is again heated, when vitrifaction ensues, the article possessing a homogenous translucent structure, and not a mere glaze or coat, as found on the common earthenware. In making soft China the English potters fully vitrify the ware by the first application of heat, the shape of the article being kept by ground flint, removable with ease after it is taken from the oven, and the glaze being subsequently applied is vitrified at a lower temperature than that used in the formation of the biscuit of soft China, the ingredients used to form which are,—

Bone . . .	46 parts.
Kaolin . . .	31 ,,
China-stone .	23 ,,

In making the glaze, a frit is first formed, which renders the glaze more easily applicable to the surface of the biscuit, by calcining a mixture similar to the following:

China-stone .	25 parts.
Soda . . .	6 ,,
Borax . . .	3 ,,
Nitre . . .	1 ,,

Of this frit, when ground, 26 parts are taken, and added to, or mixed with—

26 of ground China-stone,
31 of White Lead,
7 of Flint,
7 of Carbonate of Lime, &c.,
3 of Oxide of Tin,

in which the biscuit is dipped prior to the last application of heat. The colours to be laid on the ware are applied and burnt in prior to the formation of the glaze, an article often requiring a separate burning for each different colour; thus, especially in gilded articles, entailing an additional amount of cost and labour.

The China-stone increases the strength and sonorosity of the article, while the ground flint gives whiteness and density to the base of plastic clay: earths are by themselves infusible, but on the addition of silex or silica, another name for quartz, we form a silicate, to which, if we add a third of earth, with an alcaline base, we form a body vitrifiable and uniformly translucent.

As it may not be uninteresting to my readers, I shall briefly attempt to describe the mode in which the China-stone and China-clay are treated, prior to their being turned, twisted, and flattened, to form the numberless articles in which they greet the eye.

The China-stone is ground to a fine powder by means of a number of stones which are kept rotating on the bottom of a paved vat; when it, as well as the clay and ground flint, are mixed with a certain quantity of water, by a process termed "bluging," till of the consistence of cream, when it is passed in a state of slop or slip through a series of cambric or lawn sieves kept rapidly revolving by a water-wheel, each pint of the clay slip weighing twenty-four ounces, while that of the flint or China-stone weighs thirty-two ounces; it is then passed through a very fine silk sieve, after which these ingredients are mixed together in variable proportions in a large vat or tub, and, as soon as the mixture has attained its requisite consistence, the water is driven off by evaporation, which causing the slip to contain in its interstices an innumerable quantity of air globules, renders it necessary that it should be submitted to the process of kneading or beating, after which it was formerly thought necessary, though now abandoned, that this mass should lie fallow for three or four months, when it is considered to be fit for the lathe.

The proportions of the ingredients used in the different kinds of earthenware are as follow:

In cream colour or painted ware—Dorsetshire clay, 56 parts; kaolin or China-clay, 27; flint, 14; and China-stone, 3 parts.

In brown ware—red clay, 83; Dorset clay, 13; flint, 2; and manganese, 2 parts.

In drab ware—Cane marl, 32; Dorset clay, 22; China-stone, 45; and nickel, 1 part.

In jasper—barytes, 32; kaolin, 15; Dorset clay, 15; stone, 33; and of lead, 3 parts.

The glazes commonly used for the cream-coloured ware consists of varying proportions of white lead and China-stone, or, as these may craze, a frit of the following materials is often employed:

Of China-stone, 30; flint, 16; red lead, 25; soda, 12; and borax, 17 parts: 26 parts of this are then mixed with 15 of China-stone, 10 of flint glass, 9 of flint, and 40 of white lead; which constitutes the fritted glaze.

The composition of most of the bodies and clays now used is a secret confined to the walls of the mixing-room, so that it is extremely difficult to ascertain with any degree of accuracy, the influence of an excess of ingredients; thereby entailing a co-existent difficulty on the part of the producer, in his endeavour to form or prepare a substitute for these articles.

(*To be continued.*)

LECTURES.

An Association has just been formed, called the Hants and South Wilts Lecturers' Association, the object of which is the promotion of lectures on scientific and literary subjects in Institutes, Schools, &c. The operations are intended to include all Institutions situated in Hants and South Wilts, upon their placing themselves in union with the Association. The members are divided into two classes,—annual subscribers of 1*l.* for expenses, and lecturers whose gratuitous services shall be accepted by the Committee of the Association. The management is vested in an executive Committee of at least five members, chosen annually; the president and secretaries of the Alton, Andover, Basingstoke, Lymington, Portsmouth, Salisbury, Southampton, and Winchester Institutions in connection with the Society of Arts, on putting themselves in union, and the secretaries of local districts, having the privilege of attending and voting at all meetings of the Committee.

The range of the Society's operation will be, from time to time, divided by the Committee into local districts, as convenience may require, comprising from eight to twelve Institutions requiring lectures; the members in each district appointing a secretary to act for the whole. The subscriptions are intended to be devoted in aid of the general objects of the Association, and to the purchase of diagrams, charts, books, or papers for the use of lecturers, and the Association will endeavour to provide lectures as much as possible on the principle of mutual and gratuitous assistance. Each Institution nominated by a gratuitous lecturer or resident subscribing member will receive one lecture free of all payment for every lecture given and subscription paid. Institutions in Union will otherwise pay 1*l.* in towns, and 10*s.* in villages, each lecture, towards the expenses of paid lecturers, or 10*s.* and 5*s.* respectively, if gratuitous. All payments will be made direct to the Association, and in no case whatever to the lecturer.

The formation of this Association is mainly due to the Hon. and Rev. Samuel Best, who has undertaken the duties of its honorary secretary.

AMERICAN PATENT LAW.

The following case is given, as showing an important and novel decision affecting the validity of Patents in America. There has not been any decision in the English Courts which goes so far as this:

A suit was brought by the plaintiffs, as assignees of Daniel Fitzgerald, to recover damages for the infringement of Letters Patent, granted to Fitzgerald, June 1st, 1843, for an improvement in iron safes. The case was tried before Judge Nelson, in New York, in the year 1848; and, for the first time in that country, the doctrine was announced, that if a new machine, or art, had been previously known, and had afterwards been entirely lost sight of and forgotten, and the memory of the old machine, or art, had passed away, such a prior knowledge would not invalidate a subsequent patent obtained by one who had discovered anew the same art, or machine. This view was adopted by the judge in his charge to the jury on the trial, who thereupon found a verdict in favour of the patent, which was afterwards, on appeal, confirmed by the Supreme Court of the United States; three judges, M'Lean, Daniels, and Grier, dissenting from the opinion delivered from the Court.

The peculiar state of the facts on which that question came before the Jury in New York, and before the Supreme Court, was this:

It appeared that James Conner, who carried on the business of a stereotype-founder in the city of New York, made a safe for his own use between the years 1829 and 1832, in which plaster of Paris was employed as a non-conductor, for the protection of his papers against fire; and that he continued to use this safe until 1838, when it passed into other hands. It was kept in his counting-room, and known to the persons engaged in the foundry, and after it passed out of his hands, he used others of a different construction. It did not appear from the evidence what became of this safe afterwards; and there was nothing in the testimony from which it could be inferred that its mode of construction was known to the person into whose possession it fell, or that any value was attached to it as a place of security for papers against fire, or that it was ever used for that purpose. Upon these facts, the Court instructed the jury, that "if Conner had not made his discovery public, and it had been finally forgotten or abandoned, such a discovery and use would be no obstacle to the taking out of a patent by Fitzgerald, or those claiming under him, if he was an original, though not the first, inventor or discoverer."

In delivering the opinion of the Court, Chief Justice Taney compared Fitzgerald's discovery to the discovery of one of the lost Arts. "It is well known," he said, "that centuries ago discoveries were made in certain arts, the fruits of which are come down to us, but the means by which the work was accomplished are at this day unknown. The knowledge has been lost for ages. Yet it would hardly be doubted, if any one now discovered an art thus lost, and it was a useful improvement, that upon a fair construction of the Act of Congress, he would be entitled to a Patent. Yet he would not literally be the first, or original inventor, but he would be the first to confer on the public the benefit of the invention. He would discover what is unknown, and communicate knowledge which the public had not the means of obtaining without his invention. Upon the same principle, and upon the same rule of construction, we think that Fitzgerald must be regarded as the first and original inventor of the safe in question. The case as to this point admits that although Conner's safe had been kept and used for years, yet no test had been applied to it, and its capacity for resisting heat was not known. There was no evidence to show that any particular value was attached to it after it had passed from his possession, or that it was ever afterwards used as a place for security for papers; and it appeared that he himself did not attempt to make another like the one he is supposed to have invented, but used a different one. And upon this state of the evidence, the Court put it to the Jury to say whether this safe had been finally forgotten or abandoned before Fitzgerald's invention, and whether he was the original inventor of the safe for which he obtained the patent; directing them, if they found these two facts, that their verdict must be for the plaintiff. We think there is no error in this instruction; for if the Conner safe had passed away from the memory of Conner himself, and of those who had seen it, and the safe itself had disappeared, the knowledge of the improvement was as completely lost as if it had never been discovered, the public could derive no benefit from it until it was discovered by another inventor; and if Fitzgerald made his discovery by his own efforts, without any knowledge of Conner's, he invented an improvement that was then new, and at that time unknown; and it was not the less new and unknown because Conner's safe was recalled to his memory by the success of Fitzgerald's."

This was the principal question presented in the case as tried at New York, and as argued before the Supreme Court. (*See* 10 *Howard*, 477).

The same case was tried with a like result in Boston, and subsequently came to be tried before the Circuit Court of the United States for the Western District in Pennsylvania.

In the latter case, much light was thrown upon that question by the production on both sides of very full testimony, in reference to the nature and extent of Connor's prior use. The relative merits of Fitzgerald and Conner, as inventors, were more fully investigated in this case than had been hitherto before done; and the precise extent to which the manufacture of Conner had been carried, was brought before the Court and Jury; and although these new facts, involving other points, were such as to warrant the Jury in coming to a verdict contrary to the two former ones, yet in instructing the Jury as to the principle of law involved in this question, Mr. Justice Grier adopted and cited the decision of the Supreme Court above referred to, and left the application of that principle to the particular facts developed as at this trial to the Jury. He said, in charging the Jury,—

"The next question to be considered (if you find the defendants have infringed the patent) is, whether the patentee is the original and first inventor. As I have said, the patent is *primâ facie* evidence of this; that is, sufficient till the contrary is shown. The Patent Act of 1836, section 6, provides, 'that any person or persons having discovered or invented any new or useful art or machine, manufacture, or composition of matter, or any new or useful improvement on any art, machine, manufacture, or composition of matter, not known or used before his or their discovery, or invention thereof, may apply for a patent,' &c. The applicant is required to make oath or affirmation that he does verily believe that he is the original and first inventor, &c.; and that he does not know or believe that the same was ever before known or used. The Commissioner is required, before he is allowed to grant a patent, to inquire whether the same had been discovered or invented by any other person in this country prior to the alleged invention or discovery thereof by the applicant.

"The mere speculation of a philosopher or mechanic, never put into actual practice or operation, will not deprive a subsequent inventor who has employed his labour and talents in putting into practice, of the reward due to his ingenuity and enterprise. But if the first inventor reduced his theory to practice, and put his machine, or other invention, into use, the law would never intend that the greater or less use, in which it might be, or the more or less widely the knowledge of its existence might circulate, should constitute the criterion by which to decide upon the validity of any subsequent patent for the invention. A patent may therefore be defeated, by showing that the thing secured by the patent had been discovered and put into actual use prior to the discovery of the patentee, however limited the use or knowledge of the prior discovery might have been. (*Bedford v. Hunt*, 1 Mason, 302).

"If the original inventor of a machine abandons the use of it, and does not take out a patent first, no other person can entitle himself to a patent for it (*Evans* v.

Eaton, 1 Peters, 323). There are exceptions to this general rule as in case of a lost art, where the knowledge of it has been lost for ages; and in the present case, if you should find that Conner discovered this valuable property of plaster of paris before Fitzgerald had put it in practice by lining the interstices of a safe, but that the safe itself had disappeared, and the knowledge of the improvement was completely lost as if it had never been discovered, and Fitzgerald had afterwards made the same invention and discovery anew, his patent might stand. But if Conner's safe was in existence and in use, and the knowledge of it not entirely forgotten and lost, his omission to bring it into public use or notice by public exhibitions or experiments would not give Fitzgerald, if he was a posterior inventor, a right to a patent. Conner might have abandoned its use, and been ignorant of the extent of its value, yet his invention was substantially the same with that of Fitzgerald, the latter would not upon that ground be entitled to a patent, provided Conner's safe and its mode of construction were still on the memory of Conner, or in the knowledge or use of others before they were recalled by Fitzgerald's patent (10 Howard, 498).

"The evidence bearing on this point has been very fully and ably commented on by counsel. It is for you to apply it to the principles of law announced by the court."

HOME CORRESPONDENCE.

PATENTS.*

LETTER III.

A common argument in defence of patents is, that they are necessary for the purpose of encouraging inventors, who, it is supposed, would not invent without the chance of being so rewarded. I believe this supposition to be altogether a mistake; and I do so, although, I dare say, a great majority of the present patentees would tell you they are fully persuaded they should never have made their inventions unless they could have patented them. But even if I were to admit, which I do not, that they are capable of judging correctly what they would have done in a state of things so different as the non-existence of a Patent Law, it would affect the question very little; inasmuch, as the great majority of patents were notoriously got for inventions not worth a farthing, even when they cost six times as much as they do now; and, of course, a still larger proportion of the more numerous nventions that are now patented are equally worthless. The only question we have to consider is, whether the abolition of patents would diminish the number of really useful inventions; and I believe it would not, for the following reasons.

There can be no doubt that far the greatest number of useful inventions are made by persons who see what is wanted, or what would be an improvement, in the particular business or art which they follow or cultivate, whether as masters, workmen, or amateurs; for this is little more than saying, that a man who understands a particular "mystery" is more likely to invent improvements in it than one who does not understand it: which, however, though it is so evident a truth as to be almost a truism, seems to be very often forgotten by that class of inventors whom I have before ventured to call schemers. How, then, is a master or manufacturer of any kind likely to be no longer anxious to make improvements which will enable him to produce either a better article at the old price, or the same article at a cheaper price, merely because he can no longer have a monopoly of the improvement? If it is necessary to answer such a question, there are two obvious reasons why manufacturers will not cease to have an interest in making improvements: first, because all improvements in the quality or cheapness of anything causes an increased consumption of it, and therefore increased profits to the manufacturers of it; and secondly, because, whether there are patents or not, the man who first makes an improvement gets a start over his competitors, which is certain to be valuable to him, both from the fact that for some time he is the only person of whom the improved or the cheaper article can be obtained, and because there is generally a disposition in the public to resort to the inventor, under the belief that he is more likely to execute his own invention well than other people. This, I remember, was adverted to by several of the witnesses before the Committee on the Patent Laws in 1851.

And the same reasons which will always make it the interest of manufacturers to introduce improvements of their own, will equally make it their interest to adopt such improvements as may be suggested to them by their workmen, or by strangers, or by amateur mechanics or chemists. It is easy to say that they will probably listen to the suggestions of such persons, perhaps profess to think nothing of them, and then quickly adopt them and leave the inventor unrewarded; and the patent advocates are ready enough with instances of such things being continually done now. I certainly do not mean to assert that the abolition of the patent laws will abolish dishonest manufacturers or engineers; but those who are so loudly complaining of the existence of frauds of this kind now, must remember that they are thereby proclaiming, and rightly proclaiming, that the patent laws are *not* in that respect a protection to inventors. But, strange as it may seem, I do believe that the abolition of patents would be more likely to diminish frauds of this kind than to increase them. For one effect of the patent laws is to make everybody regard the patentee of a thing they want to use as their enemy, and as a person to be supplanted by any possible means; and it cannot be denied that there is some truth in what has often been said, that the law itself rather encourages this view, by the difficulties with which it has surrounded the defence of a patent after it has been granted. At present, if I go to a manufacturer with an invention which he privately thinks likely to be valuable to him, and ask him to take a patent for it in my name, and buy it of me, it immediately occurs to him (supposing him to be the "smart" man we are talking of) that it will be a much better thing to laugh at it, and tell me it is old, or that it won't do, or that he has just made the same invention himself, and has already entered a *caveat* at the Patent-office, or any other of the thousand-and-one lies or evasions which "smart" men keep in stock for their various occasions—for it is just a question whether the invention shall be his or mine; and having got rid of me he can very easily make it his, especially if I am too poor to go to law with him: and, by the way, the believers in the cheap patent millennium may as well remember that the expense of getting the patent is only a very small part of the performance, if it comes to a litigated question of validity or invasion.

But if it is no longer to be the question between the manufacturer and me, which of us is to have the patent, or exclusive use of the thing, but merely whether he shall give me some reasonable sum for the suggestion, the whole affair assumes a different aspect, and the temptation to him to perpetrate the aforesaid piece of smartness becomes—I do not say annihilated, but much diminished. It may occur to him that the man who has made one suggestion to him of a valuable improvement may not be unlikely to make others, and that it is not worth while to lose the chance of any future assistance for the sake of what are to him only a few pounds, though to the inventor they may be a good many. He will know, too, that his mode of dealing with one inventor, especially if it be among his own workmen, will soon become known to others; and that one such fraud may consequently have the effect of sending all those who would naturally have offered their inventions to him, to somebody else more honest. So that, even on the lowest ground, I believe that the abolition of the system of encouraging inventors by a monopoly which sets everybody against them, would probably render them not more but less liable to have their inventions stolen without acknowledgment or reward than they are at present. And at any rate these cases of stealing inventions would be the exception, and not the rule. The ordinary and regular practice with all manufacturers of good character, no one can doubt, would be to reward fairly any workman who suggested a real improvement to them: and the men would of course be in the long run influenced by what they found to be the rule, and not by an occasional and discreditable exception to it. And at the same time they would not have the temptation, which a large manufacturer told me only a few days ago prevails at present, to neglect their work while they are dreaming and scheming after some contrivance by which they expect to make not a moderate sum which would be a convenient addition to their regular wages, though not enough to induce them to lose their wages for the sake of it, but a fortune which is to set them above wages and work for ever.

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* Errata in last letter:—P. 486, second column, fourth line from bottom, for *boasted* read *lost*; p. 488, second column, twenty-fifth line from top, read, "I do *not* mean."

It cannot be necessary to say three words for the purpose of proving that the cessation of patents would have no tendency to cause a cessation of inventions either by amateurs, who take up any particular art or science at their leisure and for their pleasure, or by purely scientific men, who make science their business or their principal occupation. Whether they make or publish their inventions or discoveries from mere ambition and vanity, as is supposed by mean and vulgar-minded men who can understand nobody doing anything except from selfish motives, or whether they are influenced by the desire to increase the knowledge or the welfare of mankind, is of no consequence, since neither of these motives can be affected by the existence or non-existence of patents: and everybody knows that the prospect of making their fortune by patents is not the motive which influences men who make science either their occupation or their amusement. It is not the least answer to this to point out instances of patents, and very valuable ones too, every now and then obtained by this class of persons; for so long as the law of patents exists, there can be no reason whatever why any man of science, especially while the direct rewards and encouragement given to them by the nation are so small, should disdain to avail himself of it when he has an opportunity; and this, even though he may entertain the strongest opinion that the law ought not to exist. No doubt, if he finds afterwards that the patent is becoming an obstruction to the progress of the art to which it belongs, any man of science would be inclined, if he could afford it, to forego the advantage of retaining it, and would give it up to the public, as Mr. Talbot lately did with his patent for the photographic progress which bears his name.

There is only one other class of inventors on whom the probable effect of the abolition of patents has to be considered; and that is the class I have so often referred to in terms more of commiseration than admiration. I admit that it is possible that their numbers might be diminished if the patent lottery were shut up. But I do not admit that this would be any misfortune either to the world or to themselves, inasmuch as both their inventions and themselves are at present proverbially unsuccessful and unfortunate; and the few useful inventions which they do occasionally make they would be at least as likely to make if they had only the same kind of encouragement to make them as I have just been explaining that ordinary workmen would have. We should no longer have men neglecting their proper business, by which they might make a comfortable living, and, if they are clever and prudent, probably raise themselves to a higher condition, and wasting their time and any little money they can get hold of on schemes not much better than perpetual motion, not a few of them on that singular delusion itself, of which a very small amount of real science would have enabled them to demonstrate the impossibility, as completely as that any two sides of a triangle are greater than the third. Many a man will commit this kind of folly, like the folly of any other gambling, for the chance, however small, of making a large sum of money, who would never think of doing it for the tolerable certainty of making a moderate sum by any useful invention which may occur to him in the ordinary prosecution of his business.

Many of this class, and indeed many of every class of inventors, are persons who can no more help inventing than hens can help laying eggs. At present, if they are not rich enough to take out a patent—and patents are not to be had for nothing, though they are cheaper than they were—they have a strong inducement to keep their inventions secret, for fear they should lose the opportunity of some day patenting them; whereas, if there were no chance of their ever being able to do so, the sooner they offered the invention to the public or to somebody who would be likely to pay them for it the better it would be for them. There is now also an enormous quantity of time wasted by persons of this kind, from ignorance of scientific principles, and of what has been done before, in consequence of their not venturing to consult anybody who could give them information, lest he should get at their secret, and patent it before them. Independently, therefore, of the other evils of this secret and ignorant system of working out inventions, which is caused by men having the vision of a patent constantly before their eyes, there is no doubt that the mere saving of time uselessly spent, both in scheming after and in what we may call hoarding up inventions, would enable the inventors as a body to produce many more real novelties without neglecting their own business than they do now. In short, whatever class of inventors you contemplate, it seems to me perfectly visionary to doubt that there will always be sufficient inducement, of one kind or another, to make it quite as well worth their while to cultivate the power of inventing as any patent law can make it. And it will certainly not be the less so because the pecuniary inducement will no longer be different in its character from the rewards which all other men receive for their work and the skill required for performing it. It is not found that there is any lack of lawyers or physicians because the lawyer who wins or saves for his client an estate of 30,000*l.* a year by a clever cross-examination and demolition of a rogue, or carries a Bill in Parliament worth ten times that value to the company who employs him, only gets paid a single fee for it instead of having a grant of a portion of the profits of the estate or the railway for fourteen years; or because the doctor who saves a man's life is only paid the regular fees for his visits or his operation, and not by a royalty out of the patient's income as long as he lives. Neither is it to be forgotten that the feats of Sir Frederick Thesiger, Serjeant Wrangham, and Sir Benjamin Brodie, are never performed, as those of inventors often are, by accident, or by a lucky thought or observation, or as the result of a few experiments, or by the adoption of another man's ideas; but are only to be achieved after an expensive education, after many years of labour and experience, the early ones generally unprofitable, and the later only more profitable in proportion as their labour has become more valuable to their employers.

So much for the argument, that patents are necessary to encourage inventions. There is another, which is sometimes used, with quite as little regard to probability, and, indeed, to actual facts; viz., that if inventors were not protected by patents, they would protect themselves by keeping their inventions secret. The answers to this are obvious and conclusive: First, there are a vast number of inventions to which the word "secret" can have no application whatever, because the thing to be produced by the invention tells its own story. Watt could not have made secret steam engines, nor could you have electric telegraphs with a trick in them, which nobody could find out, except by going to the Patent-office, and reading the specification. A secret invention of a new lock, or clock-escapement, or of a screw for steam vessels, and thousands of other things which are patented, is an expression utterly without meaning. Secondly, of the inventions which are not from their nature impossible to be worked in secret,—such as new modes of manufacturing old things, which do not tell their own story—how many could be carried on in secret for any length of time, when it would better the interest of every other manufacturer to discover it? Does anybody believe that not one of all the workmen in a factory could be induced to reveal the secret for fourteen years? And even if the secret was kept for that incredible time, the world would be no worse off than if the invention had been withheld from them by a patent instead of a secret.

It is evident that the only case in which a man would have any chance of keeping a *process* secret—and that is the only kind of invention to which the term applies —would be where he has invented it himself, and where the important part of the operation or application can be performed by his own hands, or by those of a very small number of confidential persons, and not depending on machinery, which the maker of it can make again. And even these very rare and small exceptions do not really affect the question; because wherever a process of manufacturing really can be kept secret, that is now, notwithstanding the patent laws, much the best protection the owner of it can have. For if he patents it, anybody can read the specification, and pirate the invention, if he chooses to run the risk of being prosecuted; and the class of operations which can be performed by the patentee with a very few hands, and with very little machinery, are exactly those which can be also used in secret by other people with the greatest impunity. In the Great Exhibition we gave a medal to a Swiss watchmaker for a method of tempering balance springs, which made them better than any others that were submitted to us; and the process was a secret, no doubt it will be said, because there are no patents in Switzerland. But suppose there had been patents, and M. Lutz had been foolish enough to patent, and therefore to specify his process, there is not a watchmaker in the world who could not have used it as often as he pleased, without the smallest chance of the patentee being able to convict him. Indeed, it is very well known that patents for things which can be made by anybody in a small way, without much capital or machinery, are practically good for nothing as a protection (whatever they may be as an advertisement) of the patentee, on account of the impossibility of capturing the pirates, or of recovering even as much as the expenses of the capture if they are caught. And therefore it is that some manufacturers, though working with patents which theoretically give both a protection to them and also information to the public of the nature of the process, are very unwilling to let strangers see their works, on account of the facility it would afford them for carrying away and privately using what they have seen, and the difficulty of discovering such piracies. I am glad to be able to add, from good authority, however, that some of the manufacturers who are most addicted to this secret system, are getting beaten and undersold by others, who have adopted the opposite system of freely communicating to each other, and letting anybody see the improvements any of them may make. For all these reasons, I am satisfied that the apprehension of any loss to the stock of knowledge of the world in consequence of the abolition of patents, inducing or enabling inventors of new processes of manufacturing to keep such knowledge to themselves, is altogether visionary and unfounded. And so for the present,

I remain, yours faithfully,

E. B. DENISON.

P.S. "Cosmos" is very much mistaken in flattering himself that I wished to stop his writing against me, either "without a cognisance," or with. On the contrary, I shall be delighted to see such a champion of patentees prancing about the field every week. I hope that those whose protection he has undertaken are equally gratified with the spectacle. I can assure them I shall not interfere with it.

Ben Rhydding, Leeds, 29th August.

PROCEEDINGS OF INSTITUTIONS.

MELBOURNE ATHENÆUM, DERBYSHIRE.—The foundation stone of this Institution was laid on Saturday, by Lord Palmerston, in the presence of a large concourse of spectators from various parts of Derbyshire and Leicestershire.

The Rev. Mr. DEAN, the Vicar of Melbourne, on the part of the Committee, explained that the object they had in view in the erection of the building was threefold: in the first place, to provide accommodation for an infant-school; second, for a savings-bank; and third, for a Mechanics' Institution. These were the chief objects the Committee had in view; but they were fully sensible that "except the Lord build the house, their labour is but lost that build it;" and therefore he asked the Company to join him in prayer that God would grant his blessing upon the building they were about to raise. The reverend gentleman having offered up a short prayer, a silver trowel was then handed to Lord Palmerston; and the stone having been lowered to its site,

LORD PALMERSTON said, Ladies and Gentlemen, it has afforded me great pleasure to assist in laying the foundation of so interesting a building as that which is to be erected on the spot where we now stand. It is indeed a building of peculiar interest, because it is designed to be, I may say, an epitome of the life of man, as well as an exemplar of the civilization and improvement of the age. It is to contain, in the first place, a provision for infancy in the form of an Infant-school; in the next place, a provision for the instruction and amusement of man in his maturer years, in the shape of a Mechanics' Institution; and lastly, in the form of a Savings-bank,—a provision for advanced and declining age. In former times the treatment of infants was far different from that which now prevails. Mothers considered—and in some other countries they still consider—infants as incumbrances, impeding their useful exertions, and the infants used to be scolded till they cried, and beaten till they ceased to weep. In some countries mothers who want to employ themselves in useful labour wrap their infants in swaddling-clothes, and hang them up on a peg, as you would do a hat or a great coat. Now, our improved civilization has taught us that we may provide for the care of infants, and at the same time begin to instruct their youthful minds. It is, indeed, not possible to hope that great information can be instilled into children of from two to six years of age, and it is possible, perhaps, that the knowledge which is given may not long survive the period at which it is communicated to them; but they may, at all events, acquire habits of obedience, order, and regularity; and habits we all know are most important objects of education—they are the most durable in their impression; and good habits thus given to infants in their earliest age must nesessarily contribute to their happiness and welfare in their future life. When, therefore, we establish an infant-school, we are not only assisting mothers by giving them the opportunity of following a more useful occupation, but we are laying a foundation for the good order of the community of which these infants are hereafter to be members. The advantage of Mechanics' Institutions are so well known, and so justly and universally appreciated, that it would be a waste of time, I may say, to dilate upon them; but, nevertheless it cannot be useless to bear in mind that these Institutions contribute not only to the intellectual pleasures of the working classes, but also conduce greatly to their worldly comfort and advantage. With respect to their pleasures, I may say that there are no pleasures really worth having but those which are connected with the intellectual faculties. Pleasures of another kind may, perhaps, be valued for the moment, but they leave no good after them, and they tend frequently rather to degrade and brutalize than to improve and adorn those by whom they are enjoyed. On the other hand, the pleasures of the intellect increase in intensity in proportion as they are enjoyed; and they elevate the persons who cultivate them in the scale of human beings. There is this remarkable difference between the times in which we live, and the times which have passed before us. We have, indeed, in these days great discoveries and inventions made, worthy of the intellectual progress of the people who now live. We have in these days invented railways which tend to facilitate communication between towns, provinces, and countries—which tend, as it were, to render Europe one great city, and confer on different nations those advantages of easy communication which heretofore were enjoyed only by the inhabitants of separate towns. That is a great improvement, a great invention, and likely to conduce much to the prosperity, the happiness, and the welfare of mankind. We have in these days applied the power of steam to the navigation of the wide ocean. We have thereby brought countries nearer to each other, which heretofore were separated by passages of many months, and accompanied by great perils and dangers. We have also in these days achieved one of the most splendid triumphs of human genius, because it was not the result of accident, but of laborious investigation and induction—I mean the invention of the electric telegraph—an invention which brings the most distant parts of the world within minutes of each other; and which will, probably, at no distant time enable us to hold converse with our fellow-subjects in India as quickly as has been done heretofore between parties in adjoining rooms. But, Ladies and Gentlemen, former ages also had their great and important inventions and discoveries. The magnetic needle, for instance, enables man, who before used to creep timidly along the shores of seas, to launch into the wide ocean with a certain security of attaining directly the object of his search—a great invention which laid the foundation of vast improvements in the existence of mankind. Former ages also invented the art of printing—an art the usefulness of which it would be childish for me to point out to any whom I have now the honour of addressing. Former ages, also, invented gunpowder—an article which, although apparently an instrument of rapid destruction, yet gives to civilization a security and protection against barbarism; and it may be safely affirmed that, if the Romans had had that implement of war, Europe would not have been overrun by those hordes of barbarians who involved the civilised parts of the world in darkness and ignorance for many centuries in consequence of their inroads. But although in ancient times there were men of great knowledge who invented those wonderful things to which I have alluded—not to mention men of science and literature who have never since been surpassed—yet in those times knowledge was confined to the few. Now, happily, knowledge is at the command of all; books for imparting instruction of every kind are accessible at a price which places them within the reach of every one; while Mechanics' Institutions enable the working classes to profit by the exertions, bodily and intellectual, of those who have been the investigators and acquirers of knowledge. The working man may now, without going many yards from his home, acquire that knowledge of distant countries which has been gained by adventurous travellers who have traversed burning deserts or encountered the perils of the stormy ocean—who have visited the Arctic regions, or gone to the extreme of the southern world. The mechanic has now the opportunity of acquiring the result of laborious exertions without ever stirring from his home. The mechanic has now, also, the means of applying to his own purposes all that knowledge which men of deep science have gained by laborious processes, whether in chemistry, or mechanics, or in any other branch of science, and he is enabled to profit at a small expense from the investigations which have been so laboriously pursued by others. The mechanic is also by these Institutions let into the secrets of Nature, the contemplation of which tends to elevate the mind; and while, on the one hand, it teaches every man how insignificant a portion he is of that great universe which is opened up to him, on the other hand it must also tend to render him more contented with his lot and more resigned to bear any evils which Providence in its wisdom may ordain him to suffer. The mechanic, in his small room, by the library which is now placed at his command, is enabled to ascertain the wonderful fact, that insects too small to be seen by the naked eye, are yet formed with all the complicated apparatus of larger beings; that although we cannot see them, they have yet joints, limbs, and veins, blood which circulates, and lungs which breathe: that they are constructed, although with a minuteness which is hardly conceivable by man, with all the elaborate contrivances which we find in the larger objects of creation. The mechanic, by means of Institutions like the present, is enabled to carry his mind into the most distant regions of the universe. He is enabled not merely to understand the wonderful machinery of that system of which this world forms a part, but he is enabled to carry his views further, and to know that there are visible to those who have the command of the wonderful telescopes and improved optical instruments of the day, 80,000,000 of suns, each of them as large, and some of them, in all probability, larger than ours, all of them surrounded by planets, and containing probably an indefinite number of beings, all the creation of the same great and inscrutable Power which made this earth. The contemplation of these things must, I think, raise the mind of the mechanic from worldly, low, and vulgar considerations, and tend to direct his mind with fervent devotion towards that great Being from whom he derives his present existence. Well, then, if these Institutions are advantageous to the middle age of man, so also is the savings-bank a valuable establishment for declining age. There is no maxim of life more valuable than this—that man should make to-day conducive to to-morrow; that he should be willing to forego the enjoyment, the temptations, the allurements of time present, for the purpose of laying up a store which will insure his comfort in time to come. That is a maxim no less conducive to his comfort and happiness in this world, than essential to his well-being hereafter. Those who act on this maxim will find themselves comfortable, wealthy, and respected; while those who, on the other hand, are careless of to-morrow, and think only of to-day, who waste in riotous extravagance or needless pleasure those means which ought to be laid up in store for their future comfort and support, will be sure to lose the respect of their neighbours, and, what is a much greater loss, their own respect for themselves. Well, Ladies and Gentlemen, there is nothing more calculated to encourage these habits of foresight and providence than savings-banks; and I trust that the effects of establishing one in this town will be as beneficial as they have been proved to be in other places where similar institutions have been established. I trust that the working man, who, by his skill and industry, is now in receipt of ample wages, instead of squandering them, as many may now be tempted to do, by the want of any proper means of accumulating them—instead, I say, of squandering in dissipation, or, what is worse, in drink or momentary indulgences, a large portion of his earnings, will be induced to lay up a portion of them for the future support of himself and family; and depend upon it, that when once the habit is acquired, when once a man begins to feel that by providence and foresight, by laying up day by day and week by week, he is accumulating a store which will stand him in stead when the rainy day comes—when age and infirmity prevent him from working with the same activity as heretofore—when once that habit is gained, he will find it a source of pleasure as well as of advantage; he will find it a source of pride to himself to know that he has been accumulating a little store for himself; and that he will be a far happier, as well as a far more respected member of society, than he would have been had he squandered daily and weekly in riotous extravagance those means which ought to have been more advantageously laid by. I look, therefore, on this triple Institution as one, perhaps, of greater interest than any institutions that were ever before brought together under one roof, because it combines a care for man from his infancy to his most advanced age—because it provides those means which the improved civilization and greater knowledge of the times has pointed out as useful to all classes of the community. I trust that this day will be one auspicious to Melbourne. I trust that every man and child who now hear me will find in the result of this Institution benefits far greater, perhaps, than many may have anticipated, but benefits which have always attended similar Institutions wherever they have been adequately supported. There is one other topic on which I may, perhaps, be permitted to say a few words to you. There is one thing wanting to complete the Institutions of your town—I mean a school for the education of girls. There is an excellent boys' school, but there is not yet an establishment of the same nature for girls. Now, Gentlemen, it is well known that the education of women is of the greatest importance to society. Men may be, indeed, the rough stones of which the fabric of society is built; they may form the strength and resisting portion of the fabric; but women are the finer cement without which those rougher ingredients will not find order or consistency, and without which there can be no beauty, no form, no lasting and useful enjoyment. But, Gentlemen, we all know the important influence which is exerted by women upon the welfare of mankind, whether it be in the capacity of daughters, sisters, wives, or mothers; and therefore, independently of any regard for the fair sex—a regard, however, which I am persuaded all whom I am addressing feel in the strongest degree—the most selfish considerations, a single regard for ourselves, a regard for man abstractedly and independently of woman, ought to lead us to endeavour to mould and educate the rising portion of the female community, that they may be as well adapted as possible, by good training and instruction, to perform the various duties of life in the capacities of daughters, sisters, wives, and mothers; and therefore, although it forms no part of the Institution which is now about to be established, I commend to your anxious and earnest consideration the establishment likewise of a girls' school at Melbourne. I beg again to express to you the high gratification which it has afforded me to take part in this most interesting ceremony, and I conclude with wishing every possible prosperity, not only to the Institution itself, but to the town of Melbourne, of which it is destined to be not only an ornament but an honour. (Loud and repeated cheers.)

Immediately after the ceremony of laying the stone, about 150 ladies and gentlemen sat down to a cold collation, in the National School-room. Mr. J. T. Cantrell, County Court Judge, presided,—supported by Lord and Lady Palmerston, Lord Cowper, the Hon. W. Cowper, M.P., the Hon. Mrs. Lamb, the Rev. Mr. Dean, Mr. Moss (the Mayor of Derby), and Mrs. Moss, &c.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 26th August, 1853.

Dated 10th August, 1853.

1857. G. Parsons, West Lambrook, Somerset—Steam-engines and boilers.
1859. J. G. Taylor, Glasgow—Desks, work-boxes, &c., and fittings thereof.
1863. S. Hall, 16, Chadwell-street, Pentonville—Furnaces.

1865. D. Mushet, Coleford, Gloucestershire, and E. Weale, Shiffnal, Shropshire—Propelling.

Dated 11th August.

1867. J. B. Finnemore, Easy-row, and E. D. Chattaway, Camden-street, Birmingham—Registering persons entering omnibuses, buildings, &c.
1869. T. K. Hall, Crewe, Cheshire—Forge-hammers.
1870. R. F. Brand, South-terrace, Willow-walk, Bermondsey—Fire-arms and ordnance.
1871. H. P. Stephenson, Thurloe-place, West Brompton—Suspension-bridges.
1873. J. D. Dunnicliffe, Hyson-green, Nottinghamshire, and J. Woodhouse Bagley, Nottinghamshire—Manufacture of lace fabrics.
1875. T. F. Newell, Cloak-lane, Queen-street, Cheapside—Machinery for numbering pages of books, &c. (A communication.)
1877. H. Lee Pattinson, Scotts' House, West Boldon, Gateshead—Recovery of sulphur from alkali waste.

Dated 12th August.

1878. S. Adams, West Bromwich, Staffordshire — Supply of water to steam-boilers, &c.
1879. L. Van Caneghem, 6, Conduit-street, Regent-street—Fastening corsets.
1880. J. Strong, Smethwick, Staffordshire—Furnaces for smelting iron-stone, and ores.
1881. T. Turner and J. F. Swinburn, Birmingham—Sights for rifles.
1882. E. and R. Lavender, Deptford—Materials for firelighters.
1883. R. Holliday, Huddersfield—Lamps and lanterns.
1884. R. A. Brooman, 166, Fleet-street—Fuel. (A communication.)
1885. R. A. Brooman, 166, Fleet-street—New compounds for mouldings, frames, &c. (A communication.)
1886. R. A. Brooman, 166, Fleet-street—Impressions from dies, &c. (A communication.)
1887. R. A. Brooman, 166, Fleet-street—Castings in malleable iron. (A communication.)
1890. W. Littell Tizard, Aldgate—Thermometers, &c.
1891. W. Aldred, Manchester, and R. Fenton, Prestwich, W. Crone, Salford—Separating wool from cotton, &c., fabrics.
1893. H. Wareham, Fenton, Staffordshire—Inlaying earthen vessels.
1894. R. S. Bartleet, Redditch, Worcestershire — Apparatus used in sewing.

Dated 13th August.

1895. F. Lipscombe, 233, Strand—Evaporating.
1896. J. C. Boond, Manchester—Improvements in Jacquard apparatus.
1898. G. Peel and R. Brownhill, Manchester — Air-pump buckets, and steam-engine valves.
1899. C. W. Hoskyns, Wroxhall, Warwickshire—Steam to cultivation.
1901. J. and J. E. A. Gwynne, Essex-wharf, Essex-street—Manufacture of fuel.
1902. J. and J. E. A. Gwynne, Essex-wharf, Essex-street—Preparation of beet-roots for sugar manufacture.
1903. J. H. Johnson, 47, Lincoln's-inn Fields—Dyeing, and machinery for same. (A communication.)
1904. J. H. Johnson, 47, Lincoln's-inn Fields—Manufacture of gutta percha. (A communication.)
1905. E. J. Scott, Glasgow—Boots and shoes.
1906. H. Hughes, Cottage place, Middlesex—Method of producing cut and fancy patterns in fabrics.

Dated 15th August.

1908. A. Dalgety, 76, Florence-road, Deptford—Rotatory steam-engines.
1909. G. E. Dering, Lockleys, Herts—Electric telegraphs.
1910. A. Douglass, Norwich—Machinery for stitching, &c.
1911. R. A. Brooman, 166, Fleet-street—Machinery for reducing wood, &c., to pulp for paper-making.

Dated 16th August.

1913. B. Rankin, 1, College-street, Islington—Propelling.
1915. J. Martin, Liverpool—Corn-mills.
1917. P. Foxcroft, Salford—Doubling machinery.
1919. W. Hunt, Lee-brook Chemical-works, Wednesbury, Staffordshire—Manufacture of sulphuric acid.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

1945. J. W. Cochran, 17, Gower-street, London—Machinery for crushing, grinding, &c., ores. Aug. 20, 1853.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 27th, 1853.

498. James Murphy, of Newport—Improvements in trucks, waggons, or vehicles for railway purposes.
502. George Duncan, of Chelsea—Improvements in steam boilers.
503. Peter Armand le Comte de Fontainemoreau, of 4, South-street, Finsbury—Improvements in drying cigars. (A communication.)
526. Marcel Vetillart, of Le Mans, France—Improvements in drying yarns.
545. Robert Crail Ross, of Edinburgh—Improved machine or instrument for cutting files and forging metal.
547. Joseph Sparkes Hall, of Regent-street—Improvements in cutting out parts of boots and shoes.
591. John James Alexander Maccarthy, of Howland-street—Improvements in gunnery and projectiles, with pouch for the latter which are adapted for muskets, rifles, pistols, and heavy cannon, for field-pieces or forts, batteries, ships of war, and other vessels.
624. Auguste Edouard Loradoux Bellford, of Castle-street, Holborn—Improvements in machinery for cutting standing crops, and gathering the same into sheaves or bundles. (A communication.)
761. Louis Michel Lombard, of Paris—Improvements in obtaining motive power.
803. Francis Steigewald, of Munich—Improvements in the manufacture of glass and porcelain.
805. Francis Steigewald, of Munich—Improvements in heating furnaces.
846. William Moseley, of Cumberland-terrace, Regent's-park—A new method of railway traction, to be called a pony railway.
1155. Jacob Brett, of Hanover-square—Improvements in electric telegraph apparatus. (Partly a communication.)
1273. John Henry Johnson, of Lincoln's-inn Fields—Improvements in the construction of pipe and other junctions. (A communication.)
1308. Alexander Killer, of Dundee—Improved machine for the manufacture of confections, including all kinds of comfits known by the trade as pan goods.
1451. Jules Dehan, of Paris—Improvements in the manufacture of yarn, and fabricating articles therefrom.
1452. Jules Dehan, of Rue Pigale, Paris—Improvements in the manufacture of woven fabrics, yarn, cordage, ropes, paper, and pasteboard, by the application of a material not hitherto used in Great Britain for such purposes.
1456. John Elliott, of Oak-lane, Limehouse, and John Brown, of the same place—Improved machinery for making rivets, spikes, and screw-blanks.
1472. Joseph Warren, of Maldon—Improvements in ploughs.
1482. William Hall, of Aberdeen — Improvements in ship-building.
1509. Richard Cornelius, of Old Town-street, Plymouth—Improvements in the construction of churns for producing butter.
1523. Francis Huckwale, of Choice-hill, near Chipping Norton—Improvements in hand-hoes.
1524. William Geeves, of New Wharf-road—Improvements in the manufacture of bricks.
1545. Henry Goodall, of Derby—Improved machinery or apparatus for grinding or levigating various substances.
1549. John Emanuel Lightfoot, of Accrington—Improvement in the manufacture of certain colouring matter, to be used in dyeing and printing.
1563. John Henry Johnson, of Lincoln's-inn Fields—Improvements in turning over the leaves of books, music, and engravings, and in the apparatus for effecting the same. (A communication.)
1567. John Patterson, of Beverley, Yorkshire—Improvements in machines for reaping and mowing corn, grass, and other crops.
1602. Nathan Pollard, of Bowling, Yorkshire—Improvements in machinery for drawing wool and other staple.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietor's Name.	Address.
August 25	3502	Improved Joiner's Brace.	Joseph Cooper	124, Lionel-street, Birmingham.
,, 26	3503	Improved Pin-case.	Stephen Van	1, Greville-place, Kilburn-priory.
,, 30	3504	Needle-casket.	W. and W. Field	Redditch, Worcestershire.
,, 31	3505	Cylinder for Single-acting Steam-engine.	Cox and Wilson	Oldbury.